

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-255/80-12

Docket No. 50-255

License No. DPR-20

Licensee: Consumers Power Company  
212 West Michigan Avenue  
Jackson, MI 49201

Facility Name: Palisades Nuclear Generating Plant

Inspection At: Covert, MI

Inspection Conducted: 1. July 29, 1980  
2. August 19 & 20, 1980

Inspectors: 1. *J. F. Streeter*  
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9/17/80

*J. F. Streeter for*  
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Inspection Summary

Inspection on July 29, 1980 and August 19-20, 1980 (Report No. 50-255/80-12)

Areas Inspected: Reactive, announced inspection to review the circumstance and significance associated with the reported incorrect position of containment sump isolation valve CV-3030 and misoperation of the Safety Injection and Refueling Water (SIRW) Tank isolation valve CV-3031. The inspection involved 30 inspector-hours onsite by 4 NRC inspectors including 6 inspector-hours onsite during off-shifts.

Results: Five items of noncompliance (Infraction - degraded ECCS pumps - Paragraph 2.d.(1); Infraction - degraded containment spray pumps - Paragraph 2.d.(2); Infraction - failure to maintain containment integrity - Paragraph 2.d.(3); Deficiency - failure to promptly report significance of incorrect valve position - Paragraph 2.d.(4); Infraction - failure to follow procedures - Paragraph 3).

## DETAILS

### 1. Persons Contacted

#### Consumers Power Company

- \*J. G. Lewis, Director of Nuclear Services (Effective August 1)
- R. W. Montross, General Manager (Effective August 1)
- G. R. Petitjean, Station Technical Engineer
- W. S. Skibitsky, Station Operations Superintendent
- \*R. B. DeWitt, Vice President, Nuclear Operations
- \*F. W. Buckman, Ph.D., Director, Nuclear Activities Department
- \*R. A. English, Ph.D., Staff Health Physicist
- \*D. J. VandeWalle, Staff Engineer
- W. G. Brigger, General Engineer

#### Nuclear Regulatory Commission

- \*G. R. Klingler, OIE Headquarters
- \*E. M. McKenna, Reactor Safety Branch, NRR
- \*R. F. Heishman, Chief, Region III Reactor Operations and Nuclear Support Branch
- \*J. A. Hind, Chief, Region III Safeguards Branch
- \*D. C. Boyd, Chief, Reactor Projects Section 4
- \*J. G. Keppler, Director, Region III

The Resident Inspector also interviewed several other personnel on the operations and technical staffs.

\*Present at August 13 meeting in Region III office.

### 2. Incorrect Position of Containment Sump Isolation Valve CV 3030

#### a. Licensee Report and Region Response

At 1:25 p.m. (EST) on July 28, 1980, the licensee reported to the NRC Operations Center that containment sump isolation valve CV-3030 had been found during normal power operation ( 88%) on the previous day to be in the incorrect (open) position. The event was reported by the licensee under the provisions of 10 CFR 50.72. The sequence of events recorder indicated that the valve was open for a 36-hour interval from 7:36 p.m. on July 25 to 7:36 a.m. on July 27. The licensee reported that the open valve could have rendered the ECCS and containment spray pumps associated with the valve inoperable during certain accident conditions.

Region III dispatched two inspectors to the site on July 29 to supplement the efforts of the Resident Inspector. The purpose of the inspection was to review the circumstances associated

with the incorrect valve position including a review of the licensee's analysis of the potential consequences of the open valve during postulated accident conditions.

Subsequent to the inspection, Region III issued an Immediate Action Letter to the licensee on July 31 which confirmed the Region III understanding of licensee immediate corrective actions to correct the incorrect valve position and to preclude this type of event from recurring. The corrective actions by the licensee were:

- (1) Immediate closure of valve CV-3030 which returned the system to its normal position.
- (2) Retraining of licensed reactor operators and senior reactor operators on the importance of avoiding valving errors and the prompt identification of systems improperly aligned.
- (3) Implementation of a revised shift change procedure which includes the shift technical advisor changing shifts at least two (2) hours prior to the remainder of the shift.
- (4) Development and implementation by August 1, 1980, of revised procedures and shift check lists which include control room verification of correct positioning of the valve in question in addition to other safety related components.

b. System Description

The suction water supply to the three containment spray (CS) pumps, three high pressure safety injection (HPSI) pumps and two low pressure safety injection (LPSI) pumps is asymmetrically designed so that two CS, two HPSI, and two LPSI pumps are assigned to one suction header. The remaining pumps are assigned to the redundant header. Each suction header has separate piping and valving to the containment ECCS sump and to the Safety Injection and Refueling Water (SIRW) tank. During normal operation the sump suction valves are closed, isolating the dry sump from the suction lines, while the SIRW suction valves are open to keep the suction lines full and to supply an immediate source of water to the associated pumps if they become needed for accident mitigation. During a main steam, feedwater, or primary system pipe break the pumps initially take suction from the SIRW tank. Automatically, on low SIRW tank level, the LPSI pumps are tripped, pump miniflow automatic isolation valves to the SIRW tank are closed and the two normally closed containment ECCS sump suction valves are opened followed closely by closure of the two SIRW tank suction valves. This aligns the pumps for recirculation of the containment sump water prior to exhausting the water from the SIRW tank.

c. Licensee Review and Analysis

(1) Cause of Incorrect Positioning of CV 3030 and Delayed Discovery of Incorrect Positioning

At the time CV-3030 was incorrectly positioned to the open position a valve surveillance test was being conducted which involved the manipulation of a valve position switch on the control board adjacent (4 inches away) to the position switch for CV-3030. CV-3030 was not part of the surveillance test. Although the operator does not recall inadvertently opening CV-3030 during the surveillance test, circumstantial information indicates that that was the cause of CV-3030 being opened.

The incorrect position of CV-3030 went unnoticed through four shift changes. The licensee determined that the reason for the delayed discovery of the incorrect position was in large part due to the shift turnover sheet not requiring verification of the position of CV-3030. The incorrect position was found by an operator (not the operator who likely opened the valve) during a control board check. The inspectors believe that another reason the incorrect position went unnoticed for many hours was the lack of alarms or other malposition warning in the control room for critical valves. The inspectors also noticed during their control room tour that the green light covers for valve position indication were too opaque to allow ready determination of valve positions.

(2) Potential Consequences of Incorrect Position of CV-3030

The licensee's analysis of the consequences of CV 3030 being open during accident conditions indicated that during a large primary loop or large main steam break inside containment the containment pressure would exceed the water pressure from the SIRW tank pressurizing the associated pumps' suction line. This would cause the sump suction line check valve to open and allow sump water to enter the suction line. This would degrade, at least temporarily, the safety function provided by two of the three HPSI pumps, one of the two LPSI pumps, and two of the three CS pumps (all pumps connected to the affected sump suction line). The significance of this was that:

- (a) only one train of ECCS pumps was fully operable
- (b) less than two trains of containment cooling systems were fully operable for 36 hours

- (c) a pathway existed whereby post LOCA containment inventory could escape through the HPSI and LPSI pump miniflow lines and out through a vent in the SIRW tank for some short time into the accident.

The incorrect position of CV-3030 did not and would not interfere with orderly steady state operations or with plant startup and shutdowns. The incorrect valve position had the potential to degrade the function of the affected pumps only if an unlikely postulated accident occurred which resulted in elevated pressures inside containment. If no additional failures are assumed, the unaffected ECCS pumps would be capable of meeting the safety requirements for all LOCA and main steam line break conditions at the time of valve misposition. Licensee analyses being reviewed by the NRC indicate that even the degraded pumps could have provided their required safety functions.

d. Items of Noncompliance

The inspectors categorized the findings into the following noncompliances.

- (1) Technical Specifications 3.3.1 and 3.3.2 establish the limiting condition for operation related to the emergency core cooling system and require, during power operation, the operability of at least two high pressure and one low pressure safety injection pumps or one high pressure and two low pressure safety injection pumps including those valves directly associated with the pumps which are required to function during accident conditions. Failure to satisfy those minimum requirements constitutes not meeting the limiting condition for operation and in such cases plant shutdown is required by 50.36(c)(2).

Contrary to the above, the plant operated at approximately 88% power throughout the 36-hour interval from 7:36 p.m. on July 25, 1980, to 7:36 a.m. on July 27, 1980, with two of the three high pressure safety injection pumps (P-66B and P-66C) and one of the two low pressure safety injection pumps (P-67B) degraded with respect to their design function due to containment sump suction valve CV-3030 being mispositioned in the open position. The pumps were degraded in that they would have pumped sump water during elevated pressure conditions in containment following a large loss of coolant accident or main steam line break accident inside containment. This water would be hotter and less borated than that assumed in the original plant safety analyses. The sump suction valve is required to function by remaining closed during the initial (injection) phase of such accident conditions and then automatically open in the recirculation phase.

This is considered to be an item of noncompliance (255/80-12-01) of the Infraction level.

- (2) Technical Specification 3.4.3 allows continued power operation for 24 hours with containment spray pumps P54B and P54C, including valves directly associated with the pumps which are required to function during accident conditions, simultaneously inoperable providing the emergency diesel generator (1-2) connected to the opposite engineered safeguards bus is started to demonstrate operability. If both pumps are inoperable at the end of the 24-hour period, the reactor is required to be placed in the hot standby condition within 12 hours.

Contrary to the above, the plant operated at approximately 88% power during the 36-hour interval from 7:36 p.m. on July 25, 1980, to 7:36 a.m. on July 27, 1980, with containment spray pumps P54B and P54C degraded due to containment sump section valve CV-3030 being mispositioned in the open position. The emergency diesel generator (1-2) connected to the opposite engineered safeguards bus was not started during that interval to demonstrate operability nor was plant shutdown initiated. The pumps were degraded in that they would have pumped sump water during elevated pressure conditions in containment following a large loss of coolant accident or main steam line break accident inside containment. This water would be hotter than assumed in the containment heat removal analyses. The sump suction valve is required to function by remaining closed during the initial (injection) phase of such accident conditions and then automatically open in the recirculation phase.

This is considered to be an item of noncompliance (255/80-12-02) of the Infraction level.

- (3) Technical Specification 3.6.1a requires that containment integrity not be violated unless the reactor is in the cold shutdown condition.

Contrary to the above, from 7:36 p.m. on July 25, 1980, to 7:36 a.m. on July 27, 1980, the reactor was operated in other than the cold shutdown condition with containment integrity violated. Specifically, containment sump suction valve CV-3030, was open and would have allowed pumping a limited quantity of contaminated sump water to the SIRW Tank subsequent to a large LOCA. (Reduction in containment pressure and/or automatic isolation of the minimum flow lines would limit the release to the tank.)

This is considered to be an item of noncompliance (255/80-12-03) of the Infraction level.

- (4) 10 CFR 50.72(a)(6) requires in part, that licensees notify the NRC Operations Center within one hour by telephone of personnel errors which prevents or could prevent during accident conditions the fulfillment of the safety function of components important to safety that are needed to shut down the reactor safely and maintain it in a safe shutdown condition or remove residual heat following reactor shutdown.

Contrary to the above, containment sump isolation valve CV-3030 which was found mispositioned due to personnel error in the open position during normal operation at 7:36 a.m. on July 27, 1980, and which could have prevented the fulfillment of the safety function of components important to safety, was not reported to the NRC until 29 hours later. (It is recognized that licensee management, upon learning of the condition early on July 28, 1980, began immediately to evaluate the matter, and upon determination of its significance, made a prompt report to the NRC.)

This is considered to be an item of noncompliance (255/80-12-04) of the Deficiency level.

3. Misoperation of SIRW Tank Isolation Valve CV-3031

The licensee reported to the NRC that during power operation on August 19, 1980, at 0115 hours (EST) Safety Injection Refueling Water (SIRW) tank outlet valve CV-3031 was stroked per technical surveillance test QO-2 to obtain the valve stroke time. Stroking of CV-3031 while at power operation briefly incapacitates one train of safeguard pumps.

The inspector reviewed selected procedures, logs, corrective action documents, maintenance records, training records and interviewed the operation staff involved in the event.

The licensee identified to the NRC in Palisades Licensee Event Report (LER) 80-05 (dated April 10, 1980) that stroking of the SIRW outlet valves per QO-02, Rev. 7 (dated February 15, 1979) briefly incapacitates one train of safeguard pumps which violates the LCO of T.S. 3.3.2. As a result of LER 80-05, one of the changes made to QO-02, Rev. 8 (dated May 28, 1980) requires the plant to be at cold or refueling shutdown prior to performing the test. The long-term corrective action for LER 80-05 is to amend the Palisades T.S. or seek a clarification/interpretation of existing T.S.

The SIRW outlet valves were satisfactorily stroked per QO-2 (Rev. 7) when the plant was in cold shutdown on May 4, 1980. The valves were again stroked on July 5, 1980, per QO-02 (Rev. 8) following a reactor trip which required the plant to be at cold shutdown for repairs. During this test the SIRW outlet valves were stroked with

CV-3031 exceeding the pre-established stroke time. An inplant deviation report was generated and an evaluation established the actual stroke time was adequate. Subsequently, a request was made for monthly surveillance until the stroke time was restored to the pre-established stroke time. QO-02 was then issued to the operator and performed on August 19, 1980 at 0115 hours (EST). During the post test review the shift technical advisor and shift supervisor made the determination that the test should not have been performed with the plant operating at power and made appropriate notification to the NRC. In that Technical Specification 6.8.1.c requires surveillance testing procedures for safety related equipment to be implemented, licensee nonadherence to procedure QO-02 "Recirculation Actuation System" requirements for performance only during cold or refueling shutdown is an item of noncompliance.

This is considered to be an item of noncompliance (255/80-12-05) of the Infraction level.

4. Review of Licensee Analysis of Consequence of CV-3030 Being Mispositioned

On August 13, 1980, a meeting was held in the Region III office to discuss the event and to review the licensee's analysis and evaluation of the potential consequences of the event. Personnel present at this meeting are identified in Paragraph 1. The NRC was represented by the Director and members of his staff, an IE Headquarter's staff person, and an NRR staff person. The licensee was represented by the Vice President of Nuclear Operations and members of his technical staff.

The licensee presented design basis accident scenarios, assumptions, and analyses which permitted the following conclusions:

- a. The ECCS and Containment Spray Pumps on the affected supply line would not have failed due to air binding during a main steam break or LOCA. They would have been degraded, for a short period of time, by virtue of the fact that they would be pumping water of a higher temperature and a lower boron content than described in the safety analysis.
- b. The postulated breach of containment integrity would be of short duration and would be terminated by reduction in containment pressure and/or automatically by the closure of the high and low pressure safety injection pump miniflow line valves. The worst case of maximum radioactive release would result in a site boundary dose of approximately 10% of the 10 CFR 100 limits. The actually expected dose due to a major LOCA would be negligible. The licensee provided the NRC with information or data as follows:

(1) Licensee Event Report (LER) 80-021

- (a) Sequence of Events

- (b) Corrective Action
- (2) Analysis of Safety Significance
  - (a) Effect on Engineered Safeguards Operability
  - (b) Recirculation Hydraulics - LOCA
  - (c) Offsite Dose - LOCA
  - (d) Control Room Habitability - LOCA
  - (e) Effect on Main Steam Line Break Analysis
- (3) General Discussion - Main Steam Line Break (MSLB)
  - (a) Original FSAR Analysis
  - (b) Update to Evaluate Loss of Offsite Power
  - (c) MSLB Analysis for Thermal Power Uprate
  - (d) General Conclusions Applicable to LER 80-021

The licensee provided the NRC with additional data following the August 13, 1980, meeting for additional review and analysis by NRC personnel.

5. Exit Interview

The inspectors discussed the purpose, scope and results of the inspection regarding the mispositioning of valve CV-3030 by telephone with Mr. R. W. Montross on August 1, 1980. A special meeting, as discussed in Paragraph 4, was held in the Region III office on August 13, 1980, to review the analysis and conclusions regarding the safety implications of the mispositioning of valve CV-3030.

The findings of the special inspections performed by the site resident inspectors were discussed with the plant manager, Mr. R. W. Montross on August 20, 1980.